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# CALIFORNIA CONE CROP--1960[1/]

Gilbert H. Schubert and Frank J. Baron, Foresters
Division of Forest Management Research

Prospects are favorable for a good crop of forest tree seed in 1960. Field reports indicate that the cone crop on commercial forest trees will be higher this year than during the past three years. Over 50 percent of the reports rated the potential crop as medium or heavier compared to only 14 percent last year. Even with the prospects of a good seed year, the crop will vary considerably within the seed zones. However, areas with good seed crops will be more extensive than during the past few years. Heavy crops for the commercial conifers were indicated by one or more reports from the following zones:

| Species | Seed zones |
|---|---|
| Ponderosa pine | I, II, III, IV, V |
| Jeffrey pine | I, III, V, VI, VII, VIII, IX |
| Sugar pine | I, II, III, IV, V, IX, X |
| California red fir | V, X |
| White fir | II, III, IV, V, X |
| Douglas-fir | II, III, IV, X, XIII |
| Incense-cedar | II, III, IV, V, VII, X, XI |

Considerable insect and squirrel damage was observed on Douglas-fir in zones II, X, XI, XII; on white fir in zones I, II, III; on ponderosa pine in zones II and III; and on sugar pine in zones II and III. A large reduction of the cone crop can be expected particularly in zones II (sugar pine) and XI (Douglas-fir).

These are the main conclusions from a study of the cone crop reports sent to the Pacific Southwest Forest and Range Experiment Station by members of the California Division of Forestry, the California Region of the U. S.

1/ In cooperation with the California Division of Forestry and the California Region of the U. S. Forest Service.

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Forest Service, and members of the Experiment Station.

Most of the reports were based on ocular estimates in which the crop was rated as none, very light, light, medium, or heavy. The cone crops rated by the California Division of Forestry was according to the cone crop classification used in Oregon. 2/ In this classification the cone crop ratings are:

1. None--no cones on any trees or few cones on occasional trees.
2. Very light--few cones on 25 percent of the trees, or few cones on 25 percent of the trees and many cones on occasional trees.
3. Light--few cones on 75 percent of the trees, or many cones on some trees and few cones on 75 percent of the trees.
4. Medium--some cones on all trees, or many cones on less than 75 percent of the trees.
5. Heavy--many cones on 75 percent of the trees and some cones on all trees, or many cones on all trees.

Since most of the cones in California are borne on dominant and codominant trees, the Oregon system has resulted in some confusion among the field personnel. Therefore a new rating system for cone crop condition was tried this year by the California Region of the U. S. Forest Service and by the Experiment Station. In this system only seed trees (dominant trees over 12 inches d.b.h. with a full crown) were rated. In this classification the cone crop ratings are:

1. None--no cones on any seed trees.
2. Very light--few cones on less than one-fourth of the seed trees.
3. Light--few cones on more than one-fourth of the seed trees.
4. Medium--many cones on one-fourth to one-half of the seed trees.
5. Heavy--many cones on more than half of the seed trees.

Although both of these rating systems are subjective, they provide valuable information for those planning to collect seed this fall.

Several of the cone crops in seed zones IV and V were rated by the cone crop index devised by Fowells and Schubert. 3/ This index contains 5 classes of crops based on the average number of cones per tree larger than 19.5 inches in diameter:

| Cone crop rating: | Ponderosa pine | Sugar pine or white fir |
|---|---|---|
| None | 0 | 0 |
| Light | 1-20 | 1-10 |
| Medium | 21-80 | 11-40 |
| Heavy | 81-160 | 41-80 |
| Very heavy | 161-or more | 81-or more |

2/ Engstrom, W. H. Oregon cone crop, 1954. Oregon State Board of Forestry. Res. Note 16, 7 pp.

3/ Fowells, H. A. and Schubert, G. H. Seed crops of forest trees in the pine region of California. U. S. Dept. Agr. Tech. Bul. 1150. 48 pp., illus. 1956.

As an aid to seed collectors the crop reports have been segregated according to the forest tree seed collection zones described by Fowells. 4/ This grouping (table 1), shows that the most promising localities for collecting seed of major commercial conifers--those with an average rating of at least 3.5--are as follows:

| Species | Seed zones |
|---|---|
| Incense-cedar | II, III, IV, VII |
| Douglas-fir | II, IV, VII, XIII |
| California red fir | V |
| White fir | II, IV, V |
| Lowland white fir | XI, XIII |
| Jeffrey pine | I, IV, V, VI, VII, VIII, IX, XI |
| Knobcone pine | I, III, X |
| Ponderosa pine | II, III, IV, V, VII, IX |
| Sugar pine | I, II, III, VII, IX, X, XIII |
| Redwood | XII, XIII |

A map of the collection zones is appended to this note, but since the seed crop varies widely in most zones, it is also advisable to consult field offices of the California Division of Forestry or the U. S. Forest Service to determine best areas to collect cones.

Table 1.--Summary of cone crops by species and seed zone, California, 1960

| Species | Seed zone | Numbers of reports | Cone crop 1/ Average 2/ | Cone crop 1/ Range |
|---|---|---|---|---|
| CEDAR | | | | |
| Incense-cedar (*Libocedrus decurrens*) | I | 5 | 2.6 | None to medium |
| | II | 12 | 4.4 | Very light to heavy |
| | III | 8 | 4.2 | Very light to heavy |
| | IV | 16 | 4.0 | Light to heavy |
| | V | 13 | 2.9 | Very light to heavy |
| | VII | 3 | 4.7 | Medium to heavy |
| | VIII | 3 | 2.3 | None to medium |
| | IX | 6 | 2.3 | Very light to light |
| | X | 13 | 2.3 | None to heavy |
| | XI | 5 | 2.6 | Very light to heavy |
| | All | 84 | 3.3 | None to heavy |

4/ Fowells, H. A. Forest tree seed collection zones in California. U. S. Forest Serv. Calif. Forest and Range Expt. Sta. Forest Res. Note 51, 5 pp., illus. 1946.

Table 1.--Summary of cone crops by species and seed zone, California, 1960, continued

| Species | Seed zone | Numbers of reports | Cone crop 1/ Average 2/ | Cone crop 1/ Range |
|---|---|---|---|---|
| DOUGLAS-FIR | | | | |
| Bigcone Douglas-fir (Pseudotsuga macrocarpa) | IX | 6 | 2.8 | Very light to heavy |
| | X | 3 | 1.7 | None to very light |
| | All | 9 | 2.4 | None to medium |
| Douglas-fir (P. Menziesii) | I | 3 | 2.7 | None to medium |
| | II | 18 | 4.1 | Very light to heavy |
| | III | 12 | 3.0 | None to heavy |
| | IV | 5 | 4.0 | Light to heavy |
| | V | 4 | 3.2 | Light to medium |
| | VII | 1 | 4.0 | Medium |
| | VIII | 1 | 1.0 | None |
| | X | 20 | 2.6 | None to heavy |
| | XI | 24 | 2.7 | None to medium |
| | XII | 3 | 2.0 | Very light |
| | XIII | 5 | 4.0 | Light to heavy |
| | All | 96 | 3.1 | None to heavy |
| FIR | | | | |
| Bristlecone fir (Abies bracteata) | Monterey county | 1 | 3.0 | Light |
| California red fir (A. magnifica) | I | 6 | 3.2 | None to medium |
| | II | 3 | 2.7 | Very light to medium |
| | III | 14 | 3.0 | Very light to medium |
| | IV | 1 | 2.0 | Very light |
| | V | 11 | 3.5 | Very light to heavy |
| | VI | 2 | 2.5 | None to medium |
| | VII | 6 | 2.8 | Very light to medium |
| | VIII | 11 | 2.4 | None to medium |
| | X | 10 | 3.3 | None to heavy |
| | All | 64 | 3.1 | None to heavy |
| Lowland white fir (A. Grandis) | XI | 1 | 4.0 | Medium |
| | XIII | 3 | 4.3 | Medium to heavy |
| | All | 4 | 4.2 | Medium to heavy |
| White fir (A. concolor) | I | 10 | 1.9 | None to light |
| | II | 18 | 3.8 | Very light to heavy |
| | III | 17 | 2.5 | None to heavy |
| | IV | 17 | 4.4 | Very light to heavy |
| | V | 15 | 3.7 | Very light to heavy |
| | VI | 3 | 3.3 | Very light to medium |
| | VII | 6 | 1.2 | None to very light |
| | VIII | 12 | 2.4 | None to medium |
| | IX | 6 | 2.0 | Very light |

Table 1.--Summary of cone crops by species and seed zone, California, 1960, continued

| Species | Seed zone | Numbers of reports | Cone crop 1/ Average 2/ | Cone crop 1/ Range |
|---|---|---|---|---|
| White fir, cont'd | X | 14 | 2.5 | None to heavy |
| | XI | 4 | 2.0 | Very light |
| | All | 122 | 3.0 | None to heavy |
| HEMLOCK | | | | |
| Mountain hemlock (Tsuga mertensiana) | I | 1 | 4.0 | Medium |
| | VII | 2 | 5.0 | Heavy |
| | VIII | 4 | 4.5 | Medium to heavy |
| | All | 7 | 4.6 | Medium to heavy |
| JUNIPER | | | | |
| Western juniper (Juniperus occidentalis) | III | 1 | 1.0 | None |
| | VII | 3 | 3.0 | None to medium |
| | VIII | 6 | 3.3 | None to heavy |
| | All | 10 | 3.0 | None to heavy |
| PINE | | | | |
| Bishop pine (Pinus muricata) | XII | 2 | 2.0 | Very light |
| | XIII | 1 | 4.0 | Medium |
| | All | 3 | 2.7 | Very light to medium |
| Coulter pine (P. coulteri) | IX | 14 | 3.3 | Very light to medium |
| | All | 15 | 3.2 | Very light to medium |
| Jeffrey pine (P. jeffreyi) | I | 13 | 3.8 | None to heavy |
| | II | 7 | 2.7 | None to medium |
| | III | 16 | 3.1 | None to heavy |
| | IV | 12 | 3.7 | Light to medium |
| | V | 20 | 4.0 | Very light to heavy |
| | VI | 5 | 4.4 | Medium to heavy |
| | VII | 9 | 4.0 | Light to heavy |
| | VIII | 7 | 3.7 | Very light to heavy |
| | IX | 13 | 3.8 | Very light to heavy |
| | X | 4 | 2.5 | None to light |
| | XI | 1 | 4.0 | Medium |
| | All | 107 | 3.6 | None to heavy |
| Knobcone pine (P. attenuata) | I | 1 | 4.0 | Medium |
| | III | 4 | 4.0 | Light to heavy |
| | X | 4 | 5.0 | Heavy |
| | All | 9 | 4.4 | Light to heavy |
| Lodgepole pine (P. contorta) | I | 2 | 3.5 | Light to medium |
| | III | 4 | 3.0 | Very light to medium |
| | IV | 2 | 2.0 | Very light |
| | V | 4 | 3.8 | Very light to heavy |

Table 1.--Summary of cone crops by species and seed zones, California, 1960, continued

| Species | Seed zone | Numbers of reports | Cone crop 1/ Average 2/ | Cone crop 1/ Range |
|---|---|---|---|---|
| Lodgepole pine, cont'd. | VII | 3 | 4.0 | Light to heavy |
| | VIII | 8 | 3.5 | Very light to heavy |
| | IX | 1 | 5.0 | Heavy |
| | XII | 2 | 2.0 | Very light |
| | XIII | 1 | 4.0 | Medium |
| | All | 27 | 3.4 | Very light to heavy |
| Monterey pine (P. radiata) | XIII | 2 | 4.0 | Medium |
| Ponderosa pine (P. ponderosa) | I | 16 | 3.4 | None to heavy |
| | II | 30 | 3.9 | None to heavy |
| | III | 32 | 3.8 | None to heavy |
| | IV | 28 | 4.3 | Light to heavy |
| | V | 21 | 3.9 | Very light to heavy |
| | VII | 3 | 4.0 | Medium |
| | IX | 8 | 3.6 | Light to medium |
| | X | 24 | 2.2 | None to medium |
| | XI | 17 | 1.8 | None to medium |
| | XIII | 2 | 2.5 | Very light to light |
| | All | 181 | 3.4 | None to heavy |
| Single leaf pine (P. monophylla) | VI | 2 | 1.0 | None |
| | VIII | 2 | 2.0 | None to light |
| | All | 4 | 1.5 | None to light |
| Sugar pine (P. lambertiana) | I | 7 | 3.7 | Very light to heavy |
| | II | 20 | 3.6 | Very light to heavy |
| | III | 28 | 4.1 | Very light to heavy |
| | IV | 26 | 3.3 | Very light to heavy |
| | V | 14 | 3.1 | Very light to heavy |
| | VII | 2 | 3.5 | Light to medium |
| | VIII | 4 | 2.2 | None to medium |
| | IX | 8 | 4.2 | Light to heavy |
| | X | 23 | 3.9 | Very light to heavy |
| | XI | 12 | 2.9 | Very light to medium |
| | XIII | 1 | 4.0 | Medium |
| | All | 145 | 3.6 | None to heavy |
| Western white pine (P. monticola) | I | 2 | 4.0 | Light to heavy |
| | III | 5 | 4.4 | Medium to heavy |
| | V | 8 | 4.2 | Light to heavy |
| | VI | 2 | 4.0 | Medium |
| | VII | 3 | 4.7 | Medium to heavy |
| | VIII | 7 | 4.4 | Medium to heavy |
| | IX | 1 | 5.0 | Heavy |
| | All | 28 | 4.4 | Light to heavy |

Table 1.--Summary of cone crops by species and seed zones, California, 1960, continued

| Species | Seed zone | Numbers of reports | Cone crop 1/ Average 2/ | Cone crop 1/ Range |
|---|---|---|---|---|
| Whitebark pine (P. albicaulis) | I | 1 | 2.0 | Very light |
| | VIII | 3 | 5.0 | Heavy |
| | All | 4 | 4.2 | Very light to heavy |
| SEQUOIA | | | | |
| Giant sequoia (Sequoia gigantia) | IV | 1 | 5.0 | Heavy |
| | V | 5 | 3.2 | Very light to medium |
| | All | 6 | 3.5 | Very light to heavy |
| Redwood (S. Sempervirens) | XI | 1 | 3.0 | Light |
| | XII | 6 | 3.5 | Very light to medium |
| | XIII | 5 | 4.0 | Medium |
| | All | 12 | 3.7 | Very light to medium |
| ALL SPECIES | | 940 | 3.4 | |

1/ Reported by technicians of the California Division of Forestry, the California Region of the U. S. Forest Service, and the Pacific Southwest Forest and Range Experiment Station.

2/ Based on the numerical scale: 1 = none, 2 = very light, 3 = light, 4 = medium, and 5 = heavy.

Evaluation of 1959 Forecast:

In general the 1959 cone crop turned out about as predicted for most species and zones. The main exceptions were for Douglas-fir in zones XI and XII (losses due to insects were lighter than expected).

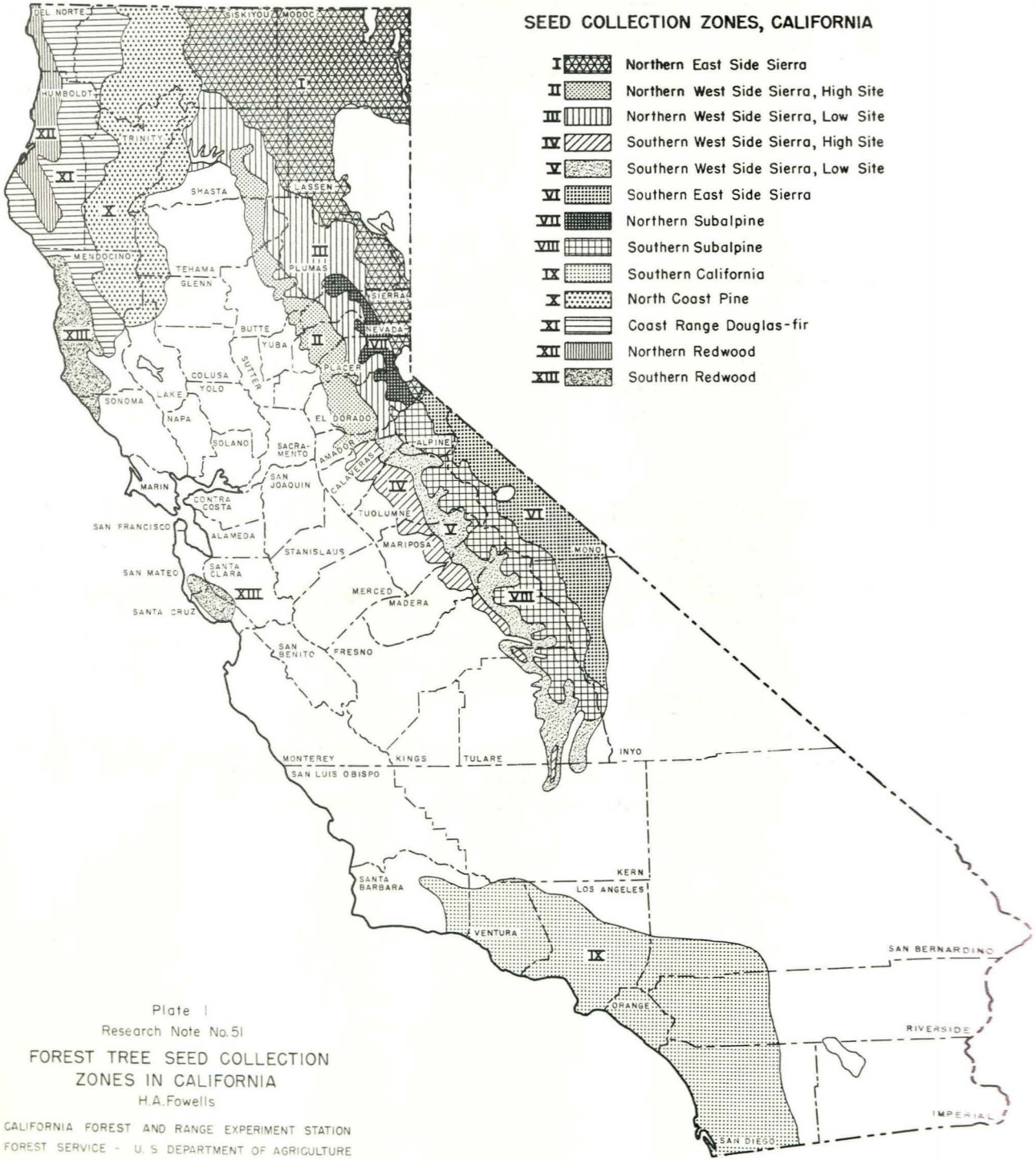


Plate I

Research Note No. 51

# FOREST TREE SEED COLLECTION ZONES IN CALIFORNIA

H.A. Fowells

CALIFORNIA FOREST AND RANGE EXPERIMENT STATION

FOREST SERVICE - U. S. DEPARTMENT OF AGRICULTURE